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14. ABSTRACT The theme of the Workshop was to identify gaps and to offer potential solutions to allow for effective implementation of embedded virtual simulation. It focused on summarizing previous and on-going research and development efforts that address the human dimensions of embedded virtual simulation for military applications. The workshop included experts from military, industry, and academia, and offered opportunities for dialogue and exchange of ideas.					
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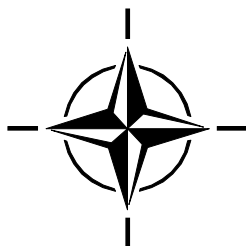
RTO MEETING PROCEEDINGS

MP-HFM-169

Human Dimensions in Embedded Virtual Simulation

(Les dimensions humaines dans la simulation virtuelle intégrée)

Papers presented at the RTO Human Factors and Medicine Panel (HFM)
Workshop held at RDECOM, Orlando, Florida, USA on 20-22 October 2009.



Published October 2009

The Research and Technology Organisation (RTO) of NATO

RTO is the single focus in NATO for Defence Research and Technology activities. Its mission is to conduct and promote co-operative research and information exchange. The objective is to support the development and effective use of national defence research and technology and to meet the military needs of the Alliance, to maintain a technological lead, and to provide advice to NATO and national decision makers. The RTO performs its mission with the support of an extensive network of national experts. It also ensures effective co-ordination with other NATO bodies involved in R&T activities.

RTO reports both to the Military Committee of NATO and to the Conference of National Armament Directors. It comprises a Research and Technology Board (RTB) as the highest level of national representation and the Research and Technology Agency (RTA), a dedicated staff with its headquarters in Neuilly, near Paris, France. In order to facilitate contacts with the military users and other NATO activities, a small part of the RTA staff is located in NATO Headquarters in Brussels. The Brussels staff also co-ordinates RTO's co-operation with nations in Middle and Eastern Europe, to which RTO attaches particular importance especially as working together in the field of research is one of the more promising areas of co-operation.

The total spectrum of R&T activities is covered by the following 7 bodies:

- AVT Applied Vehicle Technology Panel
- HFM Human Factors and Medicine Panel
- IST Information Systems Technology Panel
- NMSG NATO Modelling and Simulation Group
- SAS System Analysis and Studies Panel
- SCI Systems Concepts and Integration Panel
- SET Sensors and Electronics Technology Panel

These bodies are made up of national representatives as well as generally recognised 'world class' scientists. They also provide a communication link to military users and other NATO bodies. RTO's scientific and technological work is carried out by Technical Teams, created for specific activities and with a specific duration. Such Technical Teams can organise workshops, symposia, field trials, lecture series and training courses. An important function of these Technical Teams is to ensure the continuity of the expert networks.

RTO builds upon earlier co-operation in defence research and technology as set-up under the Advisory Group for Aerospace Research and Development (AGARD) and the Defence Research Group (DRG). AGARD and the DRG share common roots in that they were both established at the initiative of Dr Theodore von Kármán, a leading aerospace scientist, who early on recognised the importance of scientific support for the Allied Armed Forces. RTO is capitalising on these common roots in order to provide the Alliance and the NATO nations with a strong scientific and technological basis that will guarantee a solid base for the future.

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Human Dimensions in Embedded Virtual Simulation

(RTO-MP-HFM-169)

Executive Summary

The North Atlantic Treaty Organisation (NATO) Research and Technology Organisation (RTO) organized and conducted a Workshop on human factors and performance issues related to Embedded Virtual Simulation (EVS). The Workshop was held on 20 – 22 October 2009 at the University of Central Florida – Institute for Simulation and Training (UCF – IST) in Orlando, Florida. The purpose was to address human effectiveness issues related to application of EVS to the military domain.

Seventeen technical papers were presented and discussed at the Workshop. In addition to the papers, the Workshop committee members conducted a series of mind mapping exercises designed to brainstorm concepts related to EVS:

- Requirements identification;
- Training management;
- Interface technology; and
- Learning.

The technical papers and ensuing discussions led to the following generalizations:

- Some of the most mature applications of EVS have been in Command and Control (C2) domains. Examples are command centres for missile defence and shipboard AEGIS systems.
- Developments in visual simulation have led to significant advances in EVS for ground and air combat vehicle platforms. These advances are typified in the development of the FCS and the F-35, both of which explicitly required embedded training to be included in their overall design concepts.
- Training for dismounted warfighters remains perhaps the most difficult application for embedded training.
- The emerging technologies of intelligent agents and intelligent tutoring systems provide the capability to embed instructional support into the training system.
- Although the effectiveness of EVS was documented, conference members expressed disappointment that the technology has not been more generally accepted by system and training developers.

One factor that has inhibited the acceptance and application of EVS was the lack of NATO guidance on development of embedded training systems. It was suggested that the present NATO group continue to monitor the evolution of EVS technology to develop appropriate guidance and policy.

Les dimensions humaines dans la simulation virtuelle intégrée

(RTO-MP-HFM-169)

Synthèse

L'organisation pour la recherche et la technologie (RTO) de l'Organisation du Traité de l'Atlantique Nord (OTAN) a organisé et animé un atelier consacré aux facteurs humains et aux problèmes de performances liés à la simulation virtuelle intégrée (EVS). Cet atelier s'est tenu du 20 au 22 octobre 2009 à l'institut pour la simulation et la formation (IST) de l'université de Floride centrale (UCF), à Orlando, en Floride. Son objectif était d'aborder les questions d'efficacité humaine relatives à l'application de l'EVS au domaine militaire.

Dix-sept communications techniques ont été présentées et débattues lors de cet atelier. En outre, les membres du comité organisateur ont dirigé une série d'exercices de cartographie heuristique destinés à réfléchir aux concepts liés à l'EVS :

- Identification des besoins ;
- Gestion de la formation ;
- Technologie des interfaces ; et
- Apprentissage.

Les communications techniques et les discussions qui ont suivi ont conduit aux généralisations ci-dessous :

- Certaines des applications les plus avancées de l'EVS se rencontrent dans les domaines du commandement et du contrôle (C2). A titre d'exemple, citons les centres de commandement antimissiles et les systèmes AEGIS embarqués à bord des navires.
- Les progrès de la simulation visuelle ont donné lieu à des avancées considérables dans le domaine de l'EVS à destination des plates-formes de véhicules de combat aériens et terrestres. Ces avancées sont illustrées par le développement des FCS et F-35, tous deux ayant expressément nécessité l'inclusion d'une formation intégrée dans leurs projets de conception globale.
- La formation des combattants débarqués demeure sans doute l'application la plus difficile de la formation intégrée.
- Les technologies émergentes relatives aux agents intelligents et aux systèmes tutoriels intelligents offrent la possibilité d'intégrer un soutien didactique dans le système de formation.
- L'efficacité de l'EVS étant attestée par de nombreux documents, les membres de la conférence ont déploré que cette technologie ne soit pas plus généralement acceptée par les concepteurs de systèmes et de formations.

L'absence de guide OTAN concernant le développement de systèmes de formation intégrée a constitué l'un des facteurs limitatifs de l'acceptation et de l'application de l'EVS. Il a été proposé que le présent groupe OTAN poursuive la surveillance de l'évolution de la technologie EVS en vue de développer une politique et un guide appropriés.

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